sand. The water passes in through a pipe from the upper step. By the action of the water the fish are hatched. It sometimes takes one hundred and sixty days to hatch them. Salmon in their first form are ungainly, having depending from them a little bag. This after six weeks passes away, being used by the fish as its nutriment. Having grown quite lively, they are removed to ponds, care being taken not to allow fish of different ages to live together, for they are cannibals and devour those younger than themselves. After a time they are allowed to go down to the sea, and it is noticeable that salmon always return to the place where they were bred, making allowance, of course, for those that are destroyed. He had made an estimate of the value of artificial cultivation of trout and salmon, from observations made at tanks on the Tay and in Vermont. Ova sold $8 per 1,000. In pond No. 1 there were 10,000 fish fed daily by three quarts of curds. In pond No. 2 there were 8,000 fish of the second year fed upon six quarts of curds daily. In the third there are 7,000 fish fed upon twelve quarts of curds. The total return which these fish produced, was $4,350, and the net profit $3,644. From this he inferred that the cultivation of fish was well worthy of adoption.

Mr. Waterhouse Hawkins, in a response to a request from Professor Joy, added some particulars to what Captain Gilmore had stated. He wished that that gentleman had said something about the cultivation of the delicious fish called char. It was conducted in the same manner as that of trout and salmon. Some two years ago, while acting as the honorary secretary of the Acclimatization Society, in the absence of Mr. Buckland, he undertook to propagate some char. He received the ova from Windermere. They were in—some 30,000—admirable condition. He treated them as Mr. Gilmore had already described, but the gravel was boiled to remove all its inhabitants previous to being used in the troughs. The impregnated ova were removed to the ponds just before the pellicle burst, as soon as the eyes appeared. Mr. Hawkins then detailed his efforts to send some ova to the Duke of Argyll, and strongly impressed on the lyceum the value of pisciculture. In compliance with a request of Professor Joy, he explained, by means of the blackboard and one of his inimitable freehand sketches, the difference between the salmon, trout, and char.

Mr Gilmore at the suggestion of Mr. Hawkins, detailed the circumstances which led to his discovery of the char in this country. He had caught some magnificent fish in this country of striking appearance and luscious taste.

No other matter matter coming before the lyceum it adjourned.

A Coal Miner in the British Parliament.

Mr. Carter, alderman and coal merchant, is the liberal colleague of Mr. Baines in Leeds. The *European Mail* says he is a remarkable man and perhaps may astonish the House. He began life as a worker in a colliery, and by his own unaided ability has risen to be a merchant, alderman, and member of parliament. He has had but little school education, but from assiduously reading bluebooks he has got to be fairly instructed in politics. He is a fluent speaker, and is never at a loss for a word. He speaks with the real Yorkshire burr; has not an H in his vocabulary; and if any preceding speaker says anything with which he (Mr. Carter) cannot agree, he says "I am of the *contrairy* opinion." His manner is energetic, even forcible; and takes with the Leeds clothweavers. He is in politics a radical of the radicals—bold, defiant; denouncing the church, denouncing the state, the army, the navy—denouncing, indeed, everything. He is president of the Leeds branch of the Reform League, and is said to be the only member of that illustrious association returned to parliament.

Military Cart.

This is a cart which was designed by Mr. W. J. Addis, executive engineer to the Local Fund Works at Bombay, to meet the exigencies of the Abyssinian War, comprising many essential points, and differs from any existing construction. The wheels are formed of segmentary parts of wrought iron, circumferenced with wooden fellies, and tired in the usual manner. By this arrangement the shrinkage is reduced to a minimum, so that the wheels are better adapted for hot climates. Among other advantages, it is calculated to be more durable than the ordinary wooden wheel, and runs much easier. The nave is flush with the spoke and tire, thereby lessening the risk of collisions. The axles are two in number, nine inches in length, and work in two plummer blocks fixed in the frames of the cart, and are easily arranged in case of damage. Another palpable advantage is that the pole is so arranged as to admit of the cart being drawn back without the necessity of turning, while it can also be wholly withdrawn and passed through the center of the box in the body of the cart, which contains a tent, and it can also be used as a tent pole.

How to Preserve Sodium Untarnished.

Many teachers, particularly in our high schools, have sodium preserved in the usual way, under naphtha. But the beautiful metallic luster is not seen under these circumstances; and if the metal is taken out and a fresh cut made, this only shows the luster for an instant. By the following artifice the *metallic appearance of sodium may be permanently exhibited.* Take two test tubes, one a little smaller than the other, so as to slip into the latter without leaving much space between the two glass walls, put some carefully cleaned sodium in the wider tube insert the more narrow tube, having previously given a thin coating of beeswax to the upper part of this latter; then gently heating the whole on a sand bath. The sodium will fuse, and by a gentle pressure, the inner tube was pressed down, so as to force the fused metal over a large surface between the two tubes, while the air is totally excluded by the beeswax. I have kept sodium for more than six months in this way, and it is now as bright and brilliant, as when first put up.—*Prof. Gustavus Hinrichs.*

New Method of Mixing Mortar.

A correspondent from Syracuse, N. Y., sends us an account of an invention perfected in that city for mixing mortar, which is simply this: The lime is first slacked in a vat with water enough to make it to a paste, and allowed to retain its heat for about twenty-four hours—it is next run off into a second vat, from which it is pumped by a chain pump to a revolving cylinder that has a large quantity of spikes on the inside. As it flows from the cylinder, it passes through a sieve of ten meshes to the inch, and every particle that is used has to go through these very fine holes no larger than a pins' head. From this machine it falls into a large vat, from which it is pumped as required to a similar revolving machine called the mixing machine, into which it flows in a continuous stream, and sand, previously sifted, is added at the rate of about eighty bushels per hour. The mortar made in this way is said to be of a very superior quality.

INFLUENCE OF THE OXIDES OF CHROMIUM AND TITANIUM ON THE COMPOSITION OF PIG IRON.

BY AUG. A. AND S. DANA HAYES, ASSAYERS TO STATE OF MASSACHUSETTS.

Within the last four years we have been frequently employed in chemical investigations of the altered characters of some pig irons, which resulted apparently under the usual circumstances in the reduction of uniform ore.

In these cases the amount of carbon united with the iron had been diminished, without the introduction of other matter, in quantity sufficient to influence a change in this connection, and generally no variation in the composition of the ore was known or suspected. We had analyzed the ores in some of the beds in former years and regarded them as well adapted to the production of pig iron of good quality; but in pursuing the research we were convinced that the change in quality of iron could be traced to altered composition in the ore of part of the beds used for supplying the furnaces.

The correctness of this view was confirmed by our analyses of many iron ores, in some of which we found the oxides of chromium or titanium, existing where they were not indicated and connected with the ore in beds which have been considered as pure iron ores.

Both the oxide of chromium and oxide of titanium, seem to act in the furnace or the crucible in a way to withdraw a portion of the carbon, or prevent that true union of carbon with a portion of the iron, which constitutes gray pig iron, without the metals of these oxides really alloying with the iron and thus indicating the cause of change. We have analyzed samples of pig iron where the alloys of chromium or titanium existed in the pigs, and where the oxides accompanied the ores in the beds, but we were not prepared to find an influence exerted on the quality of the pig metal *without the refractory metals forming a part of the composition.*

The occurrence of oxide of manganese with iron ore is common, and titanium compounds are often found in both magnetic and brown iron ores, as insoluble substances, in small proportions, and these compounds combine with and are removed by the fluxes without injury to the pig metal. These compounds of titanium are the cause of the often superb blue color of the cinder, produced under varying conditions of glassy or stony character, and must be carefully distinguished from those we regard as more detrimental in their influence on the metal.

In a number of analyses of iron ores we had found both oxide of chromium and oxide of titanium in a state rendering them soluble in diluted acids, and in a condition to escape detection in the ordinary modes of analysis. Both magnetic and brown iron ores have been found to contain either oxide of chromium, or oxide of titanium in this soluble state. Among the samples from contiguous beds, this diversity in composition made by the presence of some oxide of chromium or oxide of titanium existed; and while the bulk of a bed of ore was pure, continuations of the bed, or associated ore, yielded notable weights of oxide of chromium or oxide of titanium in the different samples.

The suggestion we would make to the iron master in view of these facts is, the possibility of the quality of the pig metals in anomalous cases being greatly influenced by the admixture of some ore, containing the oxides of chromium or titanium, with the basis ore of good quality. This may take place by the main bed being crossed by veins of mixed ore, or by the workings passing into contiguous beds where one kind of ore is used. In other cases, where the iron master can gain the great advantage arising from mixing ores, one of the kinds may contain the contaminating oxides and injure the iron.

We subjoin some results of analyses showing the proportion of oxide of chromium to the metallic iron contained in the ores:

1st. Magnetic ore—iron, 49; oxide of chromium, 1·40. 2d. Hematite ore—iron, 42·47; oxide of chromium, 1·60. 3d. Brown Massive ore—iron, 54·32; oxide of chromium, 1·90. 4th. Same—iron, 46·70; oxide of chromium, 1·04.

More traces have been discovered in some cases, while in other instances a larger proportion of chromium formed an alloy with the iron produced from the ore.

"ARE PAINTED LIGHTNING RODS ANY PROTECTION?"

BY JOHN H. PATTERSON.

We do not believe that paint or rust totally destroys the conducting power of a lightning rod; only in proportion to the amount of impurities with which it is coated. There is, doubtless, a point beyond which a conductor will cease to be one, because the impurities upon it may be so great that it will possess no more facilities for conducting the fluid to the earth than the building itself. It would all depend upon the extent of the charge, and whether there was any tin or zinc spouting in connection with it. The very best scientific authority says that iron has 12° of conducting power, tin 14°, zinc 24°, and copper 92°. All admit that electricity will follow the best conductors only. If such is a fact it cannot be reasonably supposed that if such spouting was in contact with a perfect iron rod, that a charge of electricity would follow the main conductor to the earth. Would it not rather leave the iron rod and pass over the spouting? It certainly would if the theory alluded to is correct. Whether or not the lightning rod was painted, it is natural to suppose that combustion would ensue. The explosion might not be very great, and no serious damage might be done, and no lives lost, yet that does not refute the principle. Every few days we read of the freaks of lightning, and upon buildings, too, protected by iron rods. Why is this? Professor Douglass, of the University of Michigan, in an elaborate paper upon this subject says, that the design of a lightning rod is to prevent a stroke of lightning by silently relieving the positive atmosphere of its overcharge. This idea looks very reasonable, for Dr. Franklin said that explosions only occurred when conductors could not discharge it as fast as they received it. Now if a conductor cannot discharge the fluid there must be a cause for it. Either it is not large enough, is not perfectly applied, or it is coated with impurities. We know that an ordinary iron rod will conduct off an ordinary stroke of lightning, for it has been seen; but when an explosion occurs it cannot be stated which of the other two causes is the particular one unless the conductor is in direct contact with spouting of a superior conducting metal. Then the case is very clear. If it is in contact with such spouting, the idea that electricity follows the best conductors is correct. If the rod is insulated from both building and spouting, then the cause must be the impurities on the rod, be they paint or rust.

Lightning rods of a proper metal, copper, applied in a proper manner, are certainly a means of protection.

A recent writer quotes Professor Henry to prove that conductors should be brought in contact with the spouting on a building. This principle is certainly true respecting copper, but for the reasons given above, we hardly think it correct to expect electricity to leave a good conductor (the zinc spouting) for a poor one (an iron lightning rod), and we do not believe that Professor Henry desires to be so understood.

There can be no doubt but what the conducting power of a lightning rod is affected in proportion as it is coated with impurities of any character. If electricity, in its passage to the earth, passed into the conductor, there might be some reason to suppose that paint would not interfere with it; but when it has been demonstrated by scientific investigation that it resides only upon its exterior surface, we are not at a loss to understand why the surface of a lightning rod must be free from such impurities. That electricity does not enter into a conductor, we will refer to "Silliman's Natural Philosophy," page 540; "Olmsted's Philosophy," by Snell, page 327; and "Nichol's Cyclopedia of Physical Science," article—Electricity. In "Parker's Philosophy," page 280, we read: ". . . . and paint destroys the conducting power of a lightning rod."

We are aware that our ideas are at variance with one of the most distinguished scholars in the world—Professor Henry—and, of course, we do not think of setting aside his authority; but we have given them, and let them go for what they are worth. In this connection we refer to a letter from Professor Henry, of the Smithsonian institute, in which he says:

The paint with which lightning rods are usually covered consists principally of carbon, and as this is, in itself, a good conductor, it could hardly interfere with the conducting power of the rod. Beside this, though the electricity tends to pass at the surface of a conductor, it in reality passes within the metal, as a wire which fully conducts a discharge from a battery, may be coated with non-conducting varnish or sealing wax.

The office of a lightning rod is to protect a building from a discharge from the heavens. As a general thing its effect upon a distant cloud must be too small to silently discharge its redundant electricity, though in some rare instances it is possible that it may so reduce the intensity of the cloud as to prevent a discharge, when, without such reduction, a discharge would take place.

JOHN MACADAM—INVENTOR OF MACADAMIZED ROADS

BY JAMES PARTON.

Few persons are aware who ride over the excellent macadamized roads of the Central Park, that Mr. Macadam, the inventor of the roads which bear his name, was once a resident of New York, and probably often walked or rode over the fields and farms which then occupied the site of the park. Yet such was the fact. Though born and buried in Scotland, he lived for some years in New York; and, possibly, the horrid condition of American roads before the revolutionary war, may have first impressed upon his mind the urgent necessity there was for a better road system.

John Loudon Macadam was born in 1756, in Ayr county, Scotland, not far from the birthplace of Robert Burns. His family was ancient and highly respectable. When he was little more than an infant, one of his uncles, William Macadam, accompanied the British forces which came to America under Lord Loudoun, during the old French war, for the conquest of Canada. This William Macadam, it appears, had something to do with supplying the British army with provisions; and when the war was over, instead of returning to Europe, he settled in the city of New York, where he became a thriving merchant. When John Macadam was fourteen years of age, his father died, and the boy was sent to America to become a member of the family of his uncle William, who procured him a place in the counting-house of a friend.

This was in 1770, when New York was a quaint old place, half English, half Dutch, situated at the end of Manhattan Island; the residue of which was verdant with woods and farms, and adorned with the villas and mansions of the wealthier citizens. People who are only acquainted with Manhattan Island now, when its beautiful groves are gone, its commanding bluffs dug away, its surface excavated and excoriated for railroads and streets, can form no idea of its loveliness a hundred years ago, when Johnny Macadam was a junior clerk.

Five years after his arrival here, the revolutionary war broke out, and he was compelled to side for the king or the colonies. Being but nineteen years of age at the time, and of Scottish birth (there is a great deal of Tory blood in Scottish veins), he espoused the cause of George the Third, along with his uncle William, and a majority of the wealthier merchants of the city. In 1776, when he was still but twenty years old, General Washington was compelled to abandon New York, which, for the next seven years was in the hands of the British. After a time, this young man received the valuable appointment of prize-agent for the port of New York, which gave him a percentage upon the prizes brought in by British privateers and men-of-war. His percentage was probably pretty liberal, for he is reported to have gained a considerable fortune from his office.

Far indeed was it from the thoughts of the New York loyalists that the time would ever come when it would be beyond the power of their king to protect his faithful subjects in Manhattan. And yet that time came. In 1783, John Macadam, then twenty-seven years of age, with all the other Tories of note, was obliged to leave New York, and abandon so much of their property as they could not carry off.

On reaching his native Scotland, however, Macadam was rich enough to buy an estate in the county of Ayr, and that estate was large enough to make him an important man in the county. We find him soon a county magistrate, a trustee of the public roads, and Deputy Lord Lieutenant—offices which are never bestowed in Great Britain except upon persons of wealth and social importance. It was while he held the office of Ayrshire road trustee that he began seriously to study the subject of road making. At that time roads were universally bad, except where Nature herself had made them good.

"A broad-wheeled wagon," wrote Adam Smith, in 1774, "attended by two men, and drawn by eight horses, in about *six week's time*, carries and brings back, between London and Edinburgh (494 miles), near four tun weight of goods."

Dr. Franklin, writing in 1751, speaks of traveling seventy miles a day in England, by a post-chaise, as a most extraordinary achievement—killing to man and beast. Much of the soil of England and Scotland is a deep, rich clay, which makes the best farms and the worst roads in the universe; and yet it is particularly well adapted to the system of Macadam.

What it was which suggested to him the simple expedient of covering the soft miry roads with broken stones, averaging six ounces each in weight, has not been recorded. We only know, that, during the long wars between England and France, he held important appointments under the Crown, which made it his duty to superintend the transportation of supplies.

He then renewed the study of roads, and pursued it with all the unflagging perseverance of a thorough Scotchman. At his own expence, he traveled thirty thousand miles for the observation of roads, which occupied him more than five years, and cost him more than five thousand pounds sterling. I presume his idea was entirely original; for we cannot find any trace of a macadamized road previous to his day. The only notion which existed, previous to his time, of making a permanent road, was to pave the whole surface with pebbles, blocks, or slabs of stone; either of which was far too expensive to become general.

It was not until 1811, when he was fifty-five years of age, that Macadam made his celebrated report to the House of Commons, in which he described the condition of the roads of Great Britain, and gave an outline of his system for repairing them. In 1815, a district was assigned him for an experiment. Need I say that he met with nothing but opposition, not only from every one connected with the old road system, but even from the farmers through whose lands the first macadamized road was to be made! Such was the prejudice against his plan that he could not get the old road-makers to execute his orders, and he was obliged to get his three sons to come and assist him in superintending the details.

But the tide soon turned. A good macadamized road is an irresistible argument; and there soon arose a rage for making such roads, as furious as the former prejudice against them. Four years after he began operations, there were seven hundred miles of macadamized road in Great Britain; and, before the death of the inventor, out of the twenty-five thousand six hundred miles of high roads in England, there were not more, it is said, than two hundred and fifty miles not macadamized.

John Macadam was a strangely disinterested man. He not only refused to receive any reward for his services, including an offered knighthood, but he would not take a contract to make or repair a road, and he declined some pressing and liberal offers to take charge of the roads in foreign countries.

He was twice married; first, during his residence in New York, to a Long Island lady; and again, in his seventy-first year, to another American lady, Miss de Lancey, of New York, a member of the family which has given its name to one of our streets. He died in 1836, aged eighty years.

I have spoken above of the excellent roads in the Central Park of New York, as macadamized. I should, perhaps, have styled them *Telfordized*, for it was Thomas Telford, a famous English engineer, cotemporary with Macadam, who invented the particular plan upon which those roads are built. Macadam laid his broken stones upon the naked soil; but it was Thomas Telford who improved upon Macadam's idea by laying large, rough, flat stones upon the soil, placing upon them the broken stones of Macadam, and covering the surface with fragments of the size of a boy's marble.—*New York Ledger*.

The Fort Montgomery Explosion.

The New York *Sun* states that the recent terrible explosion in a mine near Fort Montgomery, on the Hudson river, was occasioned by nitro-glycerin in its new form of "dynamite." Some of it had been sent to the mine for trial. Having a three-inch hole, four feet deep, to fire, the foreman pounded the compound under a hammer to the consistency of fine powder, while the boss of the gang scraped it from the plank on which it was pulverized, and put about seven pounds in his can which had a thimble stopper, when the gang of three men left for the shaft. While on their way, the can was opened by the man who had it in charge to exhibit the powder to others, and as there were lighted pipes in the company, a spark came in contact, when the explosion took place. It is quite evident that this terrible substance has been somewhat tamed, but not yet sufficiently so as to justify the neglect of ordinary precaution in handling it.

Manufacture of Silk in California.

Since writing the article entitled "Why not Grow our own Silk?" we find the following additional particulars in a California exchange, relative to the silk culture in that State:

"Mulberry trees are here in great abundance, the 'Natural Wealth of California' giving 4,000,000 of trees for 1867, and we may say at least 5,000,000 for next year's use. The production of eggs has kept pace with the means to supply food for the worms, for it has been stimulated by a full demand from abroad. We raise two crops of cocoons in a season, as the rule, but three crops are not unfrequent, though the third crop draws too severely on the vitality of the tree, by over-plucking of the leaves, and it should be discouraged. We can expect but one crop of eggs in a season. The second is left to us for home use. The cocoon, which the miller cuts his way through, suffers a loss of value by the continuity of the thread being broken. But it makes good silk for goods not requiring long staple. Of this spun silk, we are accumulating stock. Mr. Englander, who made so creditable a display of silk fringes at the Fair, says it can be worked up here by our present facilities. Beside this stock, the sound cocoons left for silk, this year, may be rated at one million, and so rapid is the reproduction, that this would make ten millions for 1869. To reel, weave, and complete the fabric would give steady employment to one thousand hands, beside the great number that would find work gathering leaves, attending and feeding the worms. When we consider, that in 1870 the rapid increase of silkworms, all healthy, will give us five to ten times more cocoons than 1869, we are sensible there is no time to be lost in going into the making of silks. In one season the simple unwinding of cocoons may be taught very expertly to any number of girls. Making silk sewing thread is as simple as making other thread. Dyeing silk, though it has some peculiarities, can be done by workmen skilled in other fine coloring, and, at least, the artesian waters of our San Bruno range have the requisite freedom from impurity. Can we weave silk? will not be questioned by any one who has seen the silk cloth actually and continuously made during four weeks at the Fair, by Messrs. Joseph and Isidor Neumann, whose perseverance is worthy of the highest reward; and we trust they will soon realize it in substantial success and in public acknowledgment. Mr. Neumann has a number of new looms of the best construction ready for use, and he has invented a reel, which was in use at the Fair, and which is all that can be desired. Though silk eggs bring a price that tempts us to export them just now, the establishment of manufactories would show that it would pay us better to lose the surplus eggs and save the cocoons for thread and cloth. Notwithstanding the price of labor, we can make our own silk for 25 per cent less than the importer can put the foreign fabric on his shelves. Our land is cheaper, our trees are more prolific of leaves, our worms are not infected with disease that kills half of them and injures the silk-making perfection of the rest; our trees are new, and the quality of the leaves for food is untainted by the effects of long-continued plucking. Our climate alone gives advantages in the superior weight of our cocoons, and in the perfection of the silk they yield, to counterbalance the greater wages of labor, if we had not the other advantages enumerated; and no branch of industry affords so great a proportion of light and pleasant work for the employment of women and children."

Carbonic Acid in the Atmosphere.

The German chemist Pettenkofer, several years ago, introduced a new and more accurate method for the quantitative determination of the amount of carbonic acid in the atmosphere. By means of this method, Thorpe has obtained the following result: On the land the amount of carbonic acid in the atmosphere varies from 2½ to 8 volumes for 10,000 volumes of air; the mean for Europe is 4 volumes in 10,000 of air; in New Granada, South America, Levy had previously found 3·8 volumes during the rainy season, and 4·6 during the dry season. On the sea the variations are much less, and the amount of carbonic acid is also less; the mean of all determinations of sea air being only 3, while land air gave 4 volumes in 10,000 of air.

To show the difference between the free atmospheric air and the air in our school rooms and other crowded places, we collect the following from results, most of which were obtained by means of Pettenkofer's method; all the figures given as the amount of carbonic acid express the number of volumes of carbonic acid in 10,000 volumes of the air analyzed:

Free atmospheric air, 4. Pettenkofer's study, 3,000 cubic feet capacity—after having been there for four hours, 5 2-3; after his assistant had been with him for a little while, 9. Liebig's laboratory—capacity 46,000 cubic feet—air taken at various intervals during a lecture (about 3,000 persons present), in Munich, 6 P. M., 11; same lecture, 6 1-2 P. M., 23; same lecture, 7 P. M., 32: this last time the air was somewhat oppressive. A school room—10,400 cubic feet capacity—70 girls between nine and ten years old; temperature of room, 66 deg. Fah., at the close of the instruction, 72—or about eighteen times as much as in the free air! Sleeping rooms, for soldiers in Munich—one room, 10,147 cubic feet capacity, 19 soldiers—in the morning, 46; another room—capacity 10,255 cubic feet, 10 soldiers—in the morning, 34. A theater, very crowded, Roscoe found, 4 feet above the stage, 23; 34 feet above the stage, 32. A court room, in London, 44; Underground Railways, London, from 4 to 12. Air, fresh, inhaled, 4. Air, exhaled, on average, 400—or 100 times as much as the air inhaled.

From all determinations yet made, it may be concluded that 10 volumes of carbonic acid for 10,000 of air, are quite comfortable; when this quantity is not exceeded, the ventilation is good, no unpleasant odors are observed; but that rooms containing much more than 10 of carbonic acid in 10,000 of air (or one in a thousand) are not fit for a prolonged sojourn of people.—*Prof. Gustavus Hinrichs.*

OPINIONS OF THE PRESS.

We are indebted to our cotemporaries for many very flattering notices, only a few of which we can copy. The *Chicago Railway Review* says:

Our readers are well aware of the value which we attach to the SCIENTIFIC AMERICAN, from the frequency with which we quote its articles and refer to its conclusions. The excellence thus indorsed by us, in common with the entire newspaper press, lies not only in its scope and versatility, but in the simplicity and intelligibleness of its style. It covers the whole field of practical science, but without pretension, technicality, and dreary pedantry. It is emphatically a journal of to-day—an "abstract and brief chronicle"—brief but comprehensive and exhaustive of all branches of applied science which find a field in modern invention and industry. The last number of the XIXth volume comes to hand with a finely engraved representative title page, an earnest of the realization of the liberal promises of the prospectus of volume XX. Glancing at the index of subjects discussed and illustrated in the volume just closing, it is hard to see where improvements can be made; but we take the word of the liberal and enlightened publishers, that noticeable improvements will be made, and wait curiously, but not skeptically, to see what they will be.

The *Ambassador*, published in this city, says:

The SCIENTIFIC AMERICAN has a place, all to itself, in the world of scientific readers and writers—having neither peer nor second. It is a just compliment to American thought and enterprise, that America can lead the world in the publication of such a journal. Its specialties are practical information, art, science, mechanics, chemistry, and manufactures. Every patent invention is recorded; many of them described; many illustrated by large and handsome engravings. Every created thing, from a steam engine to a top, has a biography in the SCIENTIFIC AMERICAN. For reading matter it has carefully prepared papers on all sorts of subjects within the limits of science and art.

The Iowa *Instructor*, the educational organ *par excellence* of Iowa, thus speaks of the value of the information obtainable from the perusal of our columns to the proper qualification of teachers for their arduous and responsible labors:

The SCIENTIFIC AMERICAN is unquestionably *the* journal for all those who delight in following the inventive genius of the people of this country in that direction which at present is most prominently developed. If we were at all phrenologically inclined, we should, in giving a description of Uncle Sam's cranium, pronounce his bump of mechanical contrivances most wonderfully large—especially after a close inspection of a few numbers of the SCIENTIFIC AMERICAN. Yet it is astonishing to notice that few persons outside of the mechanical arts take an interest in these matters. Surely it is as important to understand the peculiar appliances and ingenious processes, which, as by magic, transform the natural products into such articles which civilized society demand, as it is to be able to know what peculiar twists the ancients were fond of attaching to nouns and verbs, to indicate their mutual relations. At any rate *we think it neither improper nor ungraded not to be ignorant* of some of the processes of the mechanical arts; and, indeed, we know that in other countries such knowledge is considered essential to education. If, therefore, any teacher has a predilection for such matters, we trust he will cultivate this faculty of his mind and give the result of his readings, study, and work to the pupils under his care—in order to make the children honor labor and love those who have benefited mankind by their mechanical genius.

More About the Suez Canal.

A captain of an English merchant vessel who has recently been making a trip through the Suez Canal, writes as follows to the *London Times:*

The canal, as designed, is about a hundred miles long. Of this length about half is sufficiently advanced for the sea water to reach fifty miles—that is, into the middle of the Isthmus. It is finished to its full breadth, which is a hundred yards, or the width of a considerable river, but not to the intended depth of twenty-six feet. The remaining fifty miles not yet penetrated by the sea water, are in various states of progress: parts are excavated, parts are under water, parts will have to be laid under water, which is to be supplied from a great lake not yet filled, while a good many miles have to wait for large blasting operations. To English ears it must sound promising that a good deal of clay has to be cut through; for nothing can be dealt with so successfully in this country as that material. The completion of the southern half of the canal would look like a very long work but for the fact of the immense subsidiary works being completed and a vast mass of appliances being on the spot. The service canal from the Nile to the mid point of the salt water canal, and branching thence to either extremity, is an immense work, not less than a hundred and fifty miles long, and in full use for the supply of fresh water for navigation and for otherwise assisting the work to be done. The port at the Mediterranean end is an immense work, already available. The sea channel at the Suez end has difficulties, but only such as engineers are familiar with. Forty enormous and costly dredging machines are at work on different parts of the canal—chiefly, we conclude, the northern half—discharging mountains of mud, sand and clay over the banks or into barges. The rate of expenditure is put at £200,000 per month, or two and a half millions a year. Our informant calculates that a driving wind, after blowing a month together, will send into the canal, when finished, five hundred tuns of sand a day, or fifteen thousand tuns a month. This, however, is no more than a single dredging machine would be able to keep down at a certain moderate cost in coal. The difficulty of keeping up the banks of the canal, exposed as they will be to the wash of steamers, and to a surface often agitated by the wind, is a more serious matter, but one which does not enter into the general question. Upon the whole, it does seem a moral certainty that, at least in two or three years—for one year seems out of the question—this great undertaking, worthy of a heroic age, will be brought to what we may fairly call an actual completion. In the course of the year 1871, we may probably see the sea water of one ocean flowing into the other.